WHAT IS CLAIMED IS:

1. An automated centrifuge system, comprising:

(a) at least a first rotor comprising a plurality of sample receiving regions; and,

(b) at least one transport mechanism configured to move one or more sample processing components proximal to or within the plurality of sample receiving regions;

(c) at least one robot capable of inserting at least two sample vessels into the sample receiving regions at substantially the same time; or

(d) both (b) and (c).

2. The automated centrifuge system of claim **1**, wherein the rotor comprises or is operably coupled to a rotor position sensor which determines the relative position of the sample receiving elements.

3. The automated centrifuge system of claim 2, wherein the rotor position sensor is a rotary optical encoder.

4. The automated centrifuge system of claim 1, wherein the rotor is mounted within a centrifuge chamber comprising a rotor cover configured to mate with a top surface of the centrifuge chamber.

5. The automated centrifuge system of claim **1**, wherein the rotor comprises or is operably coupled to a reference index which facilitates positioning of a cluster of sample receiving elements in the rotor relative to a group of sample processing components coupled to the transport.

6. The automated centrifuge system of claim **5**, wherein system comprises a first motor which spins the rotor to position the clusters according to the reference index.

7. The automated centrifuge system of claim **5**, wherein system comprises a second motor which spins the rotor during sample centrifugation.

8. The automated centrifuge system of claim **5**, wherein the first motor is configured to spin the rotor during sample centrifugation.

9. The automated centrifuge system of claim **1**, wherein the sample receiving regions are configured to receive a centrifuge tube.

10. The automated centrifuge system of claim **1**, wherein the sample receiving regions are arranged in clusters, each sample receiving region in a given cluster comprising a longitudinal axis substantially parallel to other sample receiving regions in the cluster.

11. The automated centrifuge system of claim **1**, wherein the sample receiving regions are arranged in a plurality of clusters each comprising a plurality of sample receiving regions, each sample receiving region in each cluster having substantially parallel longitudinal axes.

12. The automated centrifuge system of claim **1**, wherein the cluster comprises at least four sample receiving elements.

13. The automated centrifuge system of claim **1**, wherein there are between two and ten sample receiving elements in the cluster.

14. The automated centrifuge system of claim **1**, wherein the system comprises a group of sample processing components.

15. The automated centrifuge system of claim **14**, wherein the transport is configured to substantially simultaneously insert the group of sample processing components into a cluster of sample receiving regions.

16. The automated centrifuge system of claim **14**, wherein the group of sample processing components perform at least 2 different sample processing operations.

17. The automated centrifuge system of claim 14, wherein the group of sample processing components perform sample processing operations on at least 3, at least 4, at least 6, at least 8, at least 16, or at least 32 different samples at the same time.

18. The automated centrifuge system of claim **14**, wherein the group of sample processing components are arranged in at least two groups of components, wherein each group is configured to be inserted into adjacent clusters of sample receiving elements.

19. The automated centrifuge system of claim **14**, wherein the sample processing components comprise one or more sample processing component configured to transport at least one fluid.

20. The automated centrifuge system of claim 14, wherein the sample processing components are configured to selectively perform an operation selected from the group consisting of: aspiration of material away from at least one of the sample receiving

elements, dispensation of material into at least one of the sample receiving elements, vibrating a material in at least one of the sample receiving elements, measuring a property of a material in at least one of the sample receiving elements, aspiration of material away from a cluster of sample receiving elements, dispensation of material into a cluster of sample receiving elements, vibrating a material in a cluster of sample receiving elements, and measuring a property of a material in a cluster of sample receiving elements.

21. The automated centrifuge system of claim **14**, wherein the sample processing components comprise one or more sample processing components selected from the group consisting of: a fluid aspiration tube, a fluid dispensing tube, a rigid tube, a flexible tube, a vibrating member, and a sonication rod.

22. The automated centrifuge system of claim 14, wherein a plurality of the sample processing components in the group together comprise a plurality of sonication rods configured to be inserted into the sample receiving regions and a plurality of tubes configured to transport at least one fluid to or away from the sample receiving regions.

23. The automated centrifuge system of claim 14, the rotor comprising clusters of sample receiving elements, wherein the group of sample processing components is arranged in pairs of components, so that when the group is moved into a first cluster of sample receiving elements, at least one pair of sample processing components is inserted into at least one pair of corresponding sample receiving elements in the cluster.

24. The automated centrifuge system of claim **1**, wherein the at least one robot comprises a gripper mechanism configured to grasp the outside surface of a sample vessel to be inserted into the sample receiving regions.

25. The automated centrifuge system of claim 1, wherein the robot comprises a gripper mechanism configured to grasp the inside surface of a sample vessel to be inserted into the sample receiving regions.

26. The automated centrifuge system of claim **1**, wherein the sample receiving elements are arranged in clusters and the robot is configured to position at least 2 centrifuge vessels into receiving elements in at least one cluster at the same time.

27. An automated centrifuge system of claim **1**, wherein the sample receiving elements are arranged in clusters and the robot is configured to position at least 4, at least 8,

at least 16, or at least 32 centrifuge vessels into receiving elements in at least one cluster at the same time.

28. The automated centrifuge system of claim 1, wherein the robot is capable of removing a plurality of sample vessels from a plurality of sample receiving elements at the same time.

29. The automated centrifuge system of claim **1**, the system further comprising system software which controls rotation of the rotor relative to the robot such that the robot is capable of positioning centrifuge vessels into sample receiving elements of different clusters of the centrifuge rotor.

30. The automated centrifuge system of claim **1**, comprising at least one controller operably coupled to the transport, the robot, or both the transport and the robot, wherein the controller is configured to perform at least one operation selected from the group of operations consisting of: directing the transport to deliver one or more materials to the one or more sample receiving regions, directing the robot to deliver a plurality of sample vessels to the sample receiving regions, and directing the transport to move the sample processing components proximal to or within the sample receiving regions.

31. The automated centrifuge system of claim 30, wherein the controller directs the transport to insert a plurality of the sample processing components into the plurality of sample receiving regions.

32. The automated centrifuge system of claim **30**, wherein the rotor comprises a cluster of sample receiving elements and the transport is coupled to a group of sample processing components, wherein the controller directs the transport to insert the group of sample processing components into the cluster of sample receiving elements.

33. The automated centrifuge system of claim **30**, wherein the controller comprises one or more controller components selected from the group consisting of: a computer, a programmable logic controller, system software, a user interface, and a network of computers.

34. The automated centrifuge system of claim **30**, wherein the controller is configured to control rotation of the rotor.

35. The automated centrifuge system of claim **30**, further comprising an index, wherein the controller references the index to position a cluster of sample receiving

elements relative to a set of sample vessels or relative to a set of sample processing components, or both.

36. The automated centrifuge system of claim 30, wherein the controller directs the transport to insert and remove a group of sample processing components into a cluster of sample receiving elements, and further directs a rotor positioning mechanism to rotate the rotor relative to the group of sample processing components until another cluster is proximal to the group.

37. The automated centrifuge system of claim 30, wherein the controller directs the transport to insert and remove groups of sample processing components into adjacent clusters of sample receiving elements, and further directs a rotor positioning mechanism to rotate the rotor relative to the groups until another cluster or pair of adjacent clusters is proximal to the groups.

38. The automated centrifuge system of claim 30, the system comprising system software which controls rotation of the rotor relative to the robot, or the transport, or both the robot and the transport such that the robot is capable of positioning vessels in the rotor or such that the transport is capable of inserting sample processing components into the sample receiving elements, or both.

39. The automated centrifuge system of claim **30**, further including a pair of operator safety members that communicate with the controller, wherein the members, when activated, permit rotation of the rotor.

40. The automated centrifuge system of claim 39, wherein the pair of operator safety members are selected from the group consisting of: a pair of switches, a pair of buttons, and a pair of touch buttons.

41. The automated centrifuge system of claim **1**, comprising means for recognizing a sample or sample vessel when the sample or sample vessel is moved to the sample receiving region, means for recognizing the sample processing component when the sample processing component is moved proximal to or within the sample receiving region, or both, and an indexing means for tracking the sample, the sample processing component, or both, when the sample or sample processing component is moved from the sample receiving region to a different region of the automated centrifuge system, or to a separate system or device.

42. The automated centrifuge system of claim 1, the system comprising logic for tracking which sample vessels are located in which sample receiving elements.

43. The automated centrifuge system of claim **1**, the system further comprising logic for tracking what sample processing operations are performed on a sample or sample vessel.

44. The automated centrifuge system of claim **1**, further comprising one or more sample vessel structured to be insertable into at least one of the sample receiving regions, which one or more vessel contains one or more sample and comprises one or more mating feature, which mating feature mates with a corresponding mating feature of the robot.

45. The automated centrifuge system of claim **1**, further comprising:

a second rotor, the second rotor comprising a cluster of sample receiving elements; and,

a movable platform coupled to the transport or the robot; wherein the movable platform moves the transport or the robot to selectively position the sample vessels, the sample processing components, or both, for insertion of the sample vessels, the sample processing components, or both, into the sample receiving elements of the first rotor or the cluster of sample receiving elements in the second rotor, or both.

46. The automated centrifuge system of claim **1**, further comprising a rinse container structured to contain a fluid, which rinse container is configured to accept the sample processing components, wherein the transport positions the sample processing components in the rinse container, thereby rinsing the components.

47. The automated centrifuge system of claim **46**, wherein the rinse container comprises a tube bin, a rod bin and a runoff ramp.

48. The automated centrifuge system of claim **1**, wherein the sample processing components are configured to remove a material from the sample receiving regions.

49. The automated centrifuge system of claim **48**, wherein the sample processing components are fluidly coupled to a specimen collector, wherein, during operation of the system, the material is flowed from the sample processing component to the specimen collector.

50. The automated centrifuge system of claim **48**, wherein the sample processing components are fluidly coupled to a sample purification component.

51. The automated centrifuge system of claim **48**, wherein the sample processing components are fluidly coupled to a resin bed.

52. The automated centrifuge system of claim **51**, wherein the resin bed comprises a plurality of purification columns comprising a nickel chelate resin.

53. The automated centrifuge of claim 49, wherein the specimen collector comprises a collection component selected from the group consisting of: a filter, a nitrocellulose filter, a vessel, a resin, a resin bed, an ion-exchange resin and a hydrophobic interaction resin.

54. The automated centrifuge system claim **49**, wherein the specimen collector or the rotor or both are refrigerated.

55. The automated centrifuge system of claim 49, wherein the specimen collector comprises a fraction dispensing element, a resin bed into which material can be flowed from the fraction dispensing element, a collection tube rack which collects material from the resin bed, and a waste collection tray coupled to a waste dump.

56. The automated centrifuge system of claim **1**, comprising at least a second transport configured to transport a second group of sample processing components.

57. The automated centrifuge system of claim **1**, comprising:

one or more sample processing components;

one or more hoses coupled to the sample processing components, which hoses are configured to receive material transported from the sample receiving regions through the sample processing components;

one or more tips coupled to the one or more hoses;

a pump operatively coupled to the one or more hoses or to the one or more tips;

a fluid source fluidly coupled to the sample processing elements;

a specimen collector arranged to receive material from the one or more tips;

a switch which controls fluid flow between the fluid source and the sample processing elements or between the sample processing elements and the hoses or tips; and,

a waste dump configured to receive waste from the sample processing elements, the fraction collector, the tips, the hoses, the sample processing components, the sample receiving elements, vessels inserted into the sample receiving elements, the fluid source, or any combination thereof.

58. The automated centrifuge system of claim 1, comprising a centrifuge.

59. A centrifuge rotor, comprising:

a rotor body comprising at least one cluster of sample receiving elements disposed therein, wherein the cluster comprises a plurality of sample receiving elements comprising substantially parallel longitudinal axes.

60. The centrifuge rotor of claim **59**, wherein the longitudinal axes are less than completely vertical.

61. The centrifuge rotor of claim 60, wherein the longitudinal axes are at least 1° less than vertical.

62. The centrifuge rotor of claim 60, wherein the longitudinal axes are at least 5° less than vertical.

63. The centrifuge rotor of claim **59**, wherein the clusters comprise spatially grouped sample receiving elements.

64. The centrifuge rotor of claim **59**, wherein the rotor body comprises a plurality of clusters, each comprising a plurality of sample receiving elements comprising substantially parallel longitudinal axes.

65. The centrifuge rotor of claim **59**, wherein there are between two and ten sample receiving elements in the cluster.

66. The centrifuge rotor of claim **59**, wherein there are between 10 and 200 sample receiving elements in the rotor body.

67. The centrifuge rotor of claim **59**, wherein there are between 8 and 40 clusters of sample receiving elements in the rotor body, each comprising a plurality of sample receiving elements comprising substantially parallel longitudinal axes.

68. The centrifuge rotor of claim **59**, wherein each sample receiving element is capable of housing a vessel having a volume of at least about 10 mL.

69. The centrifuge rotor of claim **59**, wherein each sample receiving element is capable of housing a vessel having a volume of at least about 100 mL.

70. The centrifuge rotor of claim **59**, wherein the sample receiving elements are configured to accept a centrifuge tube.

71. The centrifuge rotor of claim **59**, wherein the cluster of sample receiving elements is arranged to substantially simultaneously receive a group of movable sample processing components held by a transport.

72. A method of treating one or more samples in a centrifuge rotor, the method comprising:

(a.) placing a sample into a sample vessel;

(b.) inserting the sample vessel into a centrifuge rotor;

(c.) rotating the rotor, thereby centrifuging the sample in the sample vessel; and,

(d.) performing one or more sample treatment operation on a component of the sample in the vessel, while the vessel is inserted into the centrifuge rotor.

73. The method of claim **72**, wherein (a.) is performed after (b.).

74. The method of claim **72**, wherein (b.) is performed after (a.).

75. The method of claim **72**, wherein (b.) comprises placing a plurality of vessels into the centrifuge rotor.

76. The method of claim **72**, wherein (d.) comprises at least one sample treatment operation selected from the group consisting of: aspirating supernatant from the vessel while the vessel located in the centrifuge rotor, delivering fluid to the vessel while the vessel is located in the centrifuge rotor, and sonicating the component within the vessel while the vessel is located in the centrifuge rotor sample receiving element.

77. The method of claim **72**, wherein (d.) comprises removing a material from the vessel while the vessel is located in the centrifuge rotor sample receiving element and depositing the material into a specimen collector.

78. The method of claim **72**, wherein (d.) comprises performing at least two different operations on at least two different sample vessels, wherein the operations are selected from the group of operations consisting of: dispensing fluid into at least one of the sample vessels, suspending a sample component in at least one of the sample vessels, and aspirating fluid from at least one of the sample vessels.

79. The method of claim **72**, wherein (d.) comprises simultaneously performing a plurality of operations on a plurality of sample components distributed in a plurality of sample vessels.

80. The method of claim **72**, wherein (d.) comprises simultaneously performing a plurality of different operations on a plurality of sample components distributed in a plurality of sample vessels.

81. The method of claim **72**, further comprising:

transporting a sample component from the vessel, while the vessel is located in the centrifuge rotor, to a specimen or fraction collector, or to a sample purification component.

82. The method of claim **81**, wherein the specimen collector comprises one or more component selected from the group consisting of: a filter, an array of filters, a nitrocellulose filter, and array of nitrocellulose filters, a vessel, a resin, a nickel chelate resin, a resin bed, an ion-exchange resin, a waste rack, a waste dump, and a hydrophobic interaction resin.

83. The method of claim **72**, further comprising:

recognizing the vessel when the vessel is inserted into the rotor and tracking the vessel when it is transferred from the centrifuge rotor to a separate system or device.

84. The method of claim **72**, wherein the sample vessel is inserted into the rotor with a robot and wherein the sample treatment operation is performed with one or more sample treatment components which are coupled to a transport.

85. A method of centrifuging a sample, the method comprising:

providing a rotor comprising a plurality of clusters of sample receiving elements;

loading at least one sample into at least one of the plurality of clusters; and,

rotating the rotor, thereby centrifuging the sample.

86. The centrifuge rotor of claim **85**, wherein the longitudinal axes of the sample receiving elements in the clusters are less than completely vertical.

87. The centrifuge rotor of claim 86, wherein the longitudinal axes are at least 1° less than vertical.

88. The centrifuge rotor of claim 86, wherein the longitudinal axes are at least 5° less than vertical.

89. The centrifuge rotor of claim **85**, wherein the clusters comprise spatially grouped sample receiving elements.

90. The method of claim **89**, wherein each cluster comprises at least four substantially parallel sample receiving elements.

91. The method of claim **85**, wherein the rotor comprises between 8 and 40 clusters, each comprising between 2 and 10 sample receiving elements.

92. The method of claim **85**, wherein the sample is contained within a centrifuge tube, wherein the tube is loaded into the rotor, thereby loading the sample into the rotor.

93. The method of claim **85**, comprising inserting a group of sample processing components into at least one selected cluster.

94. The method of claim 93, wherein the group of sample processing components is coupled to a transport that inserts the group into a selected cluster.

95. The method of claim 93, wherein the group of sample processing components are simultaneously instated into the selected cluster.

96. The method of claim 93, wherein the group of sample processing components performs a plurality of sample processing functions on materials contained within the selected cluster.

97. The method of claim 93, wherein the group of sample processing components are arranged so that when the group is inserted into the cluster, at least one sample processing component is inserted into each sample receiving element within the cluster.

98. The method of claim 93, wherein the group of sample processing components perform sample treatment functions on at least 3, at least 4, at least 6, at least 8, at least 16 or at least 32 different samples at substantially the same time.

99. The method of claim 93, wherein the group of sample processing components perform at least 2 different sample processing operations simultaneously.

100. The method of claim 93, further comprising removing the sample processing components, rotating the rotor, and re-inserting the set of sample processing components, wherein the sample processing components, after re-insertion, perform at least one operation selected from the group of operations consisting of: aspirating supernatant, delivering fluid to the sample receiving elements, and sonicating a sample component in the sample receiving element.

101. The method of claim 93, wherein the operation performed is selected from the group consisting of: aspirating supernatant, removing material from the sample receiving elements, dispensing material into the sample receiving elements, vibrating the sample, sonicating the sample, and measuring a property of the sample.

102. The method of claim 93, comprising positioning the cavities relative to the sample processing components using a reference index.

103. The method of claim **85**, comprising removing liquid from the sample receiving elements, and depositing the liquid into a specimen collector.

104. The method of claim **85**, comprising:

robotically attaching a plurality of centrifuge vessels to an arm of a robot;

moving the arm adjacent to the rotor; and,

robotically inserting the plurality of centrifuge vessels into a selected cluster, at the same time.

105. The method of claim **104**, wherein the centrifuge vessels comprise the sample.

106. The method of claim **104**, wherein the robot simultaneously inserts at least 3, least 4, at least 8, at least 16, or least 32 centrifuge vessels into the plurality of clusters, at the same time.

107. The method of claim **104**, further comprising:

robotically attaching a second plurality of centrifuge vessels to the arm of the robot; and,

robotically inserting the second plurality of centrifuge vessels into a different selected cluster of the centrifuge rotor, the second plurality of centrifuge vessels being inserted at the same time.

108. The method of claim **85**, wherein the sample is a fermentation sample.

109. The method of claim **85**, comprising:

robotically inserting a plurality of sample vessels into the clusters; and,

robotically inserting a group of sample processing components into at least one selected cluster and performing a sample processing operation with the sample processing components.

110. The method of claim **85**, comprising robotically removing a group of sample processing components from a first cluster, rotating the rotor until a second cluster is proximal to the sample processing components, re-inserting the sample processing components into a second cluster and again performing the same sample processing operation or a different sample processing operation on samples in the second cluster.

111. The method of claim **85**, comprising robotically inserting a cell pellet removal component which removes a cell pellet from at least one of the sample vessels.

112. An automated method of claim **111**, the method further comprising reintroducing supernatant removed from a centrifuge vessel into a corresponding centrifuge vessel.

113. An automated method of claim **112**, the method further comprising centrifuging the removed supernatant once reintroduced into the corresponding centrifuge vessels.